

Re: equilateral triangles

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- *From:* "Philippe 92" <nospam@xxxxxxxxxxxxxx>
 - *Date:* Thu, 01 Dec 2005 00:57:15 +0100
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eugene wrote :

> Let ABC be an equilateral triangle. Points A_1, B_1, C_1 are chosen inside the
> triangle in such a way that $A_1 \in CC_1, B_1 \in AA_1, C_1 \in BB_1$ and
> $AB_1 = B_1A_1, BC_1 = C_1B_1, CA_1 = C_1A_1$. Prove that the triangle $A_1B_1C_1$ is
> also equilateral.
>
> I'd be very grateful if someone could help me.

In complex plane :

A triangle abc is equilateral (direct) iff $a + j*b + j^2*c = 0$
with $j = \exp(i*\pi/3) = (1 + i*\sqrt{3})/2$
That is from vector $AC = AB*\exp(i*\pi/3)$, and $AC = c-a$ etc...,
using $j^2 + j + 1 = 0$, because $j^3 - 1 = (j-1)(j^2 + j + 1) = 0$.

In this problem we have :

$a_1 = (c_1 + c)/2$ etc...
Calculate $a_1 + j*b_1 + j^2*c_1$, use abc equilateral and $j^3 = 1$,
conclude.

Regards.

—

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• *References:*

◆ *equilateral triangles*

◇ *From:* eugene

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